

Atmospheric Excitation of Rapid Polar Motion

R Gross (Jet Propulsion Laboratory, California Institute of Technology,
4800 Oak Grove Dr., Pasadena, CA 91109-8099; ph: 818-354-4010;
fax: 818-393(890; e-mail: rsg@logos.jpl.nasa.gov)

The solid Earth wobbles on all observable time scales, yet the excitation mechanism(s) of these observed variations are largely unknown. Diurnal and semi-diurnal ocean tides have been shown to be the dominant cause of sub-daily polar motion, and atmospheric pressure and wind fluctuations have been shown to be the main cause of the annual wobble. However, at virtually all other frequencies the cause(s) of the observed polar motions are largely unknown. Here, intraseasonal fluctuations in atmospheric pressure and wind are studied to determine the extent to which they may cause the observed rapid polar motions.

Daily estimates of the pole position from satellite laser ranging measurements are available since 1983, with independent estimates determined from global positioning system measurements available since mid-1990s. These daily polar motion time series are deconvolved to recover the observed polar motion excitation functions which are then compared to atmospheric angular momentum (AAM) excitation functions available since 1976 from operational numerical weather prediction centers. Besides analyzing these excitation functions in the x- and y-coordinate directions, they will be projected onto different longitudes in order to determine if there exists a preferred direction for the excitation of rapid polar motions. Results and implications of these studies will be presented and discussed.